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ABSTRACT

The use of the 2 x 2 matrix in qualitative data analysis and theory generation is discussed, embracing the perspective that the objective of qualitative research in general and the analysis of qualitative data in particular is the development of theory. A 2 x 2 matrix is considered to be a tabular representation of the relationship of two orthogonal and exhaustive factors (analytic factors) to a third factor (synthetic factor). The four levels of the synthetic factor are related to the four possible pair-wise interactions of the levels of the analytic factors. The simplest form of a complete theoretical statement is a trivariate theoretical statement, which is represented parsimoniously by a 2 x 2 matrix. If the purpose of qualitative data analysis is to generate grounded theory, then the simplest form of the theoretical statements that constitute the theory can be expressed as a 2 x 2 matrix. A specific example is given of the use of a 2 x 2 matrix in a study of alternative teaching work orientations and incentives. A further example from the present authors' prior research concerns the work of school-based specialists. Five figures illustrate 2 x 2 matrices and provide examples of their use. (SLD)

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THE 2 X 2 MATRIX IN QUALITATIVE DATA ANALYSIS AND THEORY GENERATION

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THE 2 X 2 MATRIX IN QUALITATIVE DATA ANALYSIS AND THEORY GENERATION

Introduction

The analysis of qualitative data concerned with social science phenomena (Durkheim, 1938, 1966) is at once frustrating and exciting (Marshall & Rossman, 1989). Although considerable attention has been given to the collection and management of qualitative field data (Glaser & Strauss, 1967; Lofland & Lofland, 1984; Schatzman & Strauss, 1973), it has only been in the last ten years that specific attention has been given to methods and procedures for analyzing qualitative data (Miles & Huberman, 1984; Strauss, 1987).

A variety of methods have been and are recommended for analyzing qualitative data. Some of the analytic methods include the use of a variety of visual techniques including models, diagrams, tables, and typologies (Miles & Huberman, 1984; Strauss, 1987). Most models, diagrams, tables, and typologies can be viewed as a type of matrix. This paper is concerned with the use of a particular type of matrix in qualitative data analysis. This matrix is often referred to as the **2 X 2 matrix**.

The 2 X 2 matrix has been and continues to be used in the analysis and presentation of analyses of qualitative data. C. Wright Mills (1959) reported that he typically used the 2 X 2 matrix in his analyses, yet the matrices do not appear explicitly in the presentations of his analyses. Douglas E. Mitchell, on the other hand, not only employs 2 X 2 matrices in his analyses, he individually, and in collaboration with others, presents his

analyses employing 2 X 2 matrices. However, the reasons for and the process employed in using 2 X 2 matrices in the analysis of qualitative data are not well elaborated. It is the intention of this paper to extend and enrich the debate concerning the analysis of qualitative field data employing a theoretically defensive yet practical and compelling visual and analytical technique.

Perspective

Prior to addressing the objectives of this paper, it is important to make explicit the perspective of the authors regarding the purposes of qualitative research. Some researchers hold that the purpose of qualitative research is primarily to describe in rich detail social phenomena. Important among the proponents of this perspective is Geertz (1973) who is attributed with developing the concept of "thick description." However, other researchers hold that the purpose of qualitative research is primarily to generate theory regarding social phenomena. Important among those who hold this perspective are Glaser and Strauss (1967) who are attributed with developing the concept of "discovering grounded theory." The authors of this paper hold the latter perspective. We clearly embrace the perspective that the objective of qualitative research in general and the analysis of qualitative data in particular is the development of theory. Consistent with this perspective, we firmly believe that an understanding of the concept of theory and the generation of theories from qualitative data analysis is essential to the qualitative research enterprise.

Objectives

Considering our perspective regarding qualitative research, the objectives of the paper are twofold. The first is to argue and demonstrate that the most parsimonious form of a theoretical statement among qualitative factors is a **2 X 2 matrix**. And, the second objective is to demonstrate the utility of the **2 X 2 matrix** in the analysis of qualitative data and the presentation of theoretical relationships generated in the analysis of qualitative data.

The 2 X 2 Matrix

One of the compelling aspects of qualitative research is the description and analysis of specific and relatable experiences and contexts. In contrast to this aspect of qualitative research, what follows is an abstract yet necessary discussion of the properties of 2 X 2 matrices and theories, and the relationship of the properties of 2 X 2 matrices and theories with respect to the analysis of qualitative data for the purpose of generating theory.

For purposes of this paper, a **2 X 2 matrix** is considered to be a tabular representation of the relationship of two orthogonal and exhaustive factors to a third factor. The two orthogonal and exhaustive factors are referred to as **analytic factors**, and each have two independent exhaustive levels. The third factor is referred to as the **synthetic factor**, and it has four independent exhaustive levels. The four levels of the synthetic factor are related to the four possible pair-wise interactions of the levels of the analytic factors. It should be noted that the 2 X 2

matrix is, of course, a special case of and the simplest, non-trivial form of **m X n X o X p X ...** matrix, where **m, n, o, p, ...** are integers, **0, 1, 2, 3, ...** and represent an exhaustive and orthogonal set of factors.

The 2 X 2 matrix can be presented symbolically in the following notation:

$$A \;\&\; B \;\Longrightarrow\; C, \tag{1}$$

$$a_1 \;\&\; b_1 \;\Longrightarrow\; c_{11}, \tag{2}$$

$$a_2 \;\&\; b_1 \;\Longrightarrow\; c_{21}, \tag{3}$$

$$a_1 \;\&\; b_2 \;\Longrightarrow\; c_{12}, \tag{4}$$

and,

$$a_2 \;\&\; b_2 \;\Longrightarrow\; c_{22}, \tag{5}$$

where:

> A and B are analytic factors; a_1 and a_2 are independent exhaustive levels of A, and b_1 and b_2 are independent exhaustive levels of B; C is a synthetic factor of A and B; and, c_{11} = [read: **identical with**] (a_1,b_1), c_{21} = (a_2,b_1), c_{21} = (a_1,b_2), and c_{22} = (a_2,b_2), where (a_1,b_1), (a_2,b_1), (a_1,b_2), and (a_2,b_2) are all possible pair-wise interactions of the analytic factors A and B respectively.

Statements (1) through (5) above are read as follows: (1) **The analytic factors A and B constitute the synthetic factor C.** (2) **Level a_1 and level b_1 constitute level c_{11}.** (3) **Level a_2 and level b_1 constitute level c_{21}.** (4) **Level a_1 and level b_2 constitute level c_{12}.** And, (5) **Level a_2 and level b_2 constitute level c_{22}.**

With respect to (1) through (5) above, three important considerations need to be noted. First, it needs to be noted that the directionality indicated in (1) through (5) above can be

in the reverse direction, **or** it can be in both directions simultaneously. If (1) through (5) are written in the reverse direction, then <== is read: **is constituted by.** If (1) through (5) are written in both directions simultaneously, then <==> is read: **constitutes and is constituted by.**

Secondly, it also needs to be noted that the relationship between **A & B** (taken together) and **C**, and the levels of **A**, **B**, and **C**, in (1) through (5) are not completely specified. For example, the relationship between **A & B** and **C** and the levels of **A**, **B**, and **C** could be merely constitutive, it could be associative, or it could be causal. In each of the these cases, the symbols, ===>, <===, and <===>, would be read differently. Further details are needed to specify the relationship between **A & B** and **C** in order to read the symbols appropriately.

And, thirdly, with respect to (1) through (5), it needs to be noted that the relationship between A and B and the relationships between levels of **A** and **B** in (1) through (5) is not completely specified. As presented, **A** and **B** and the levels of **A** and **B** are merely indicated to be interactive. The relationship may simply be additive, or it may be something as interesting as one described by chaos theory (Briggs & Beat, 1989; Gleick, 1987).

Given the conditions presented above, a tabular representation of the **2 X 2 matrix** described above is presented in Figure 1.

		A	
		a_1	a_2
B	b_1	c_{11}= (a_1,b_1)	c_{12} = (a_2,b_1)
	b_2	c_{21} = (a_1,b_2)	c_{22} = (a_2,b_1)

Figure 1.

A tabular representation of the relationship **A** & **B** ==> **C**, where **A** and **B** are orthogonal and exhaustive analytic factors, and **C** is a synthetic factor, where a_1 and a_2, and b_1 and b_2 are independent exhaustive levels of **A** and **B** respectively, and where c_{11}, c_{12}, c_{21}, and c_{22} are independent exhaustive levels of **C**.

Theoretical Statements

In general, a scientific theory is a symbolic representation and explanation of some empirical phenomenon (Kaplan, 1964). In the social sciences, the term theory can be considered to mean "an integrated body of propositions, the derivation of which leads to explanation of some social phenomenon" (Denzin, 1978, p. 6). Implied in these conceptions of the term theory is that a theory is concerned with and explains more than a singular phenomenon in, of, and for itself. A theory always has some level of generality. Hence, a theory is concerned with at least two cases of a phenomenon. It can be said then that a particular theory is always concerned with a range of social phenomena rather than a single social phenomenon.

A proposition identifies the components and describes the relationship among components of some salient aspect of a social phenomenon. In this discussion, the term **theoretical statement** will be substituted for the term **proposition**.

In this paper, Denzin's conceptualization of the term theory will be employed; however, as noted above, the term **theoretical statement** will be substituted for the term **proposition**. For purposes of this paper, a theory will be considered to be an integrated set of theoretical statements which explain some social phenomena.

A theoretical statement (or proposition) identifies salient components of a social phenomenon (or some part of a phenomenon) and explains the relationship among the components. In the social sciences, a component of a social phenomenon is typically characterized in conceptual terms (Merton, 1968). With respect to theoretical statements, Denzin (1978, p. 63) states:

> [Theoretical statements] give theory its quality of explanation. They represent an advance beyond concept development and permit the construction of deductive schemes. Sociologists have at their disposal a number of different types of ... [theoretical statements]. [Theoretical statements] ... may be categorized in terms of the number of concepts combined; their causal breadth (e.g., the number of cases explained); the relationship between concepts (e.g., interactive, direct, etc.); the causal status assigned to the independent variable (e.g., interchangeability with other independent variables).

Hence, a theoretical statement has two types of elements. One type consists of the components of a social phenomenon; the other type consists of the relationship among the components. The former asserts the existence of components of a social

phenomenon, and the latter asserts the relationship among the components.

This paper is concerned with the analysis of qualitative data associated with social phenomena. Qualitative research typically places considerable emphasis on the components of social phenomena and not very much emphasis on the relationship among components. Hence, in this paper a discussion of the theoretical components of a social phenomena will be explored and the theoretical relationships among components of a social phenomena will not be discussed further.

The simplest form of a theoretical statement is what is referred to as a bivariate proposition (Denzin, 1978). A bivariate theoretical statement has the form:

A ==> B,

where A and B are salient components of social phenomenon. This statement is read **A constitutes B**. For example, in the adage, "practice makes perfect," A represents the concept of practice and B represents the concept of perfection, then the adage would be represented as: **A ==> B**. The notation can be interpreted to mean a variety of relationships between practice and perfection. For example, the notation can have at least three different meanings. These are: Practice is a component of perfection; practice is associated with perfection; and practice produces perfection. Each of these relationships, of course, could be specified in detail and with precision. However, regardless of the relational meaning, this and all other bivariate theoretical statements regarding social phenomena are incomplete.

In the example regarding practice and perfection, there is a missing, yet implied, component. The implied component in the adage is **people**. Hence, the adage should be read, "People who practice make perfection." Now the adage as a theoretical statement should be written, **A & B ==> C**, where **A** represents the component **people**, **B** represents the component **practice**, and **C** represents the component **perfection**. The theoretical statement is then read: **People and practice constitute perfection.** Given that the concepts of **people**, **practice**, and **perfection** each embody a level of variety, then each of these concepts becomes a factor which can be separated into at least two subfactors that are qualitatively different and may represent some quantifiable range.

As was suggested in the example above, all bivariate theoretical statements imply at least one additional component (or variable) because of two important operational assumptions regarding social phenomena. One assumption is that all social phenomena have relevant and salient component parts. The other assumption is that a given social phenomenon is assumed to have existed in an antecedent condition and changed or remained unchanged to another condition through the interaction with at least one factor. Put more simply, it is assumed that all social phenomena are composed of parts, and social phenomena do not change or remain stable independently. Hence, in the empirical investigation of social phenomena and the representation of the conclusions of these investigations in terms of theoretical statements and theories, it is assumed that all social phenomena

do not exist independently and have relevant component parts. In symbolic terms, this means that bivariate theoretical statements of the form **A ==> B** are incomplete, and that the simplest form of a complete theoretical statement is a trivariate theoretical statement which has the form **A & B ==> C**, where **A** and **B** are orthogonal and exhaustive components of **C**, and **A** and **B** have at least two independent levels, a_1 and a_2, and b_1 and b_2, respectively which interact in pair-wise combinations to constitute four independent levels of **C**, c_{11}, c_{21}, c_{12}, and c_{22}. A parsimonious representation of this trivariate theoretical statement is, of course, a **2 X 2 matrix**.

Qualitative Data Analysis

Qualitative data analysis has at least two essential components. These include the **analysis** of field data, and the other is the **synthesis** of field data. The term **analysis** has the meaning of observing some phenomena as a whole (or a meaningful part of a whole), and through careful study, identifying the salient component parts of the whole (or the meaningful part of the whole), as well as identifying the relationships among the component parts of the whole (or the meaningful part of the whole). In the social sciences, the term **qualitative data analysis** has the meaning of carefully studying systematically collected information (usually referred to as field data) regarding some social phenomena, and through the careful study of the information, identifying and describing the salient components of the phenomena (or a meaningful part of the phenomena), and identifying and describing the relationships

among the components and the whole (or the meaningful part of the phenomena).

The term **synthesis** has the meaning of observing some phenomena and through careful study identifying component parts which in combination constitute the whole (or a meaningful part of the whole) phenomena. In the social sciences, the term qualitative data analysis also has the meaning of **qualitative data synthesis**. Data synthesis has the meaning of carefully studying systematically collected information (as noted above, usually referred to as field data) regarding some social phenomena (or meaningful part of a social phenomena), and through the careful study of the information, identifying and describing the whole phenomena (or a meaningful part of the whole) in terms of salient component parts, as well as identifying and describing how the component parts that yield the whole (or the meaningful part of the whole).

If the purpose of qualitative data analysis is to generate grounded theory (Glaser & Strauss, 1967), then the simplest form of the theoretical statements which constitute the theory is: **A & B ==> C**, where **A** and **B** are orthogonal and exhaustive components of **C**, and **A** and **B** have at least two independent levels, a_1 and a_2, and b_1 and b_2, respectively which interact in pair-wise combinations to constitute four independent levels of **C**, c_{11}, c_{21}, c_{12}, and c_{22}.

The 2 X 2 Matrix and Qualitative Data Analysis

Using a **2 X 2** matrix in the analysis of qualitative data is not a new idea. Writing in 1959, C. Wright Mills in the

appendix, titled Intellectual Craftsmanship, of his well known publication, The Sociological Imagination, speaks of cross-classification. (pp. 211-217). With respect to imagination, which Mills means the analysis of qualitative data, he states:

> Many of the general notions you come upon, as you think about them, will be cast into types. A new classification is the usual beginning of fruitful developments. The skill to make up types and then to search for the conditions and consequences of each type will, in short, become an automatic procedure with you. Rather than rest content with existing classifications, in particular, common-sense ones, you will search for their common denominators and for differentiating factors within and between them. Good types require that the criteria of classification be explicit and systematic. To make them so you must develop the habit of cross-classification. (p. 213, emphasis added).

Mill goes on to state:

> ... I do not believe I have written more than a dozen pages first-draft without some little cross-classification--although, of course, I do not always or even usually display such diagrams. Most of them flop, in which case you have still learned something. When they work, they help you to think more clearly and to write more explicitly. They enable you to discover the range and the full relationships of the very terms which you are thinking and of the facts with which you are dealing.

Mills' observations are critical in the analysis of qualitative data analysis for the purpose of theory generation.

An Example of a 2 X 2 Matrix

The previous discussion has been an abstract argument regarding the utility of employing 2 X 2 matrices in the analysis of qualitative data. To give concrete meaning regarding the utility of 2 X 2 matrices, a specific example of a 2 X 2 matrix in which an analysis of qualitative data is analyzed is useful. There are many researchers and theorists who employ 2 X 2

matrices in the presentations of their analysis. As noted above, prominent among these in the field of educational research is Douglas E. Mitchell. Over a span of at least twenty years much of his theoretical and empirical work individually and collectively has been explicitly presented employing 2 X 2 matrices (see for example, Mitchell, 1984; Mitchell, Ortiz, & Mitchell, 1984; Mitchell & Spady, 1983; Kerchner & Mitchell, 1988). The following example of a 2 X 2 matrix in Figure 2 is taken from the publication, Work Orientation and Job Performance; The Cultural Basis of Teaching Rewards and Incentives, authored by Douglas E. Mitchell, Flora Ida Ortiz, and Tedi K. Mitchell, and published in 1987.

With respect to their analysis, which is presented in a 2 X 2 matrix, Mitchell, Ortiz, and Mitchell state:

> The fifteen teachers in our study fall into four distinct groups when organization-level, purposive incentives and group level, solidary incentives are considered simultaneously....
>
> Critical elements in the purposive and solidary incentive systems are suggested along the margins of Figure ...[2]. ...adopting an achievement production goal encourages teachers to concentrate on instructional processes, whereas nurture goals call for an evocative or educative approach to teaching. Similarly, achievement producers concentrate more on curricular content, while nurturers emphasize teaching relationships. Achievement producers see school as work; nurturers see it as a opportunity or an adventure.
>
> As indicated along the left margin of the figure, school-keeping strategies emphasize grade-level performance within district curricular programs, while lesson teaching concentrates on the presentation of novel, potentially exciting materials and activities which the teacher is confident will produce specific learning outcomes for a particular class or group.

> Consequently, school keepers find children's abilities an important factor in thinking about and planning their teaching activities, while the lesson teacher see student interest as more important.

Without further comment, the 2 X 2 matrix of Mitchell, Ortiz, and Mitchell concerning four alternative teaching work orientations and incentives is presented in Figure 2.

Using the 2 X 2 Matrix in the Analysis of Qualitative Data

For purposes of further developing understanding of the 2 X 2 matrix and, perhaps, indicating the skills required in employing a 2 X 2 matrix in the analysis of qualitative data, we shall present an example from our own research. The example comes from a qualitative study concerned with the work of school-based specialists (Reed, 1982; Reed, 1986). These specialists work in public schools and are expected to collaborate with classroom teachers in providing educational services, primarily of a remedial nature, to mutually shared pupils. The study involved nine specialists who represented a broad variation across areas of specialization, work location, case load size, degree of involvement in case load selection, grade levels served, and gender. The field data were collected over a seven month period using traditional qualitative research methods.

For purposes of demonstration, the use of the 2 X 2 matrix in the analysis of qualitative data, only a portion of the analysis of the study noted above will be presented. Through the analysis of the field the following conclusions were reached: The work of school-based specialists is composed to three distinct tasks. These are: (1) Getting students, or in the words of specialists, "scheduling students," "developing my schedule"

		PURPOSIVE ORGANIZATIONAL MISSION INCENTIVE SYSTEMS	
		PRODUCING ACHIEVEMENT --- Instructional Emphasis, Learning as Work	**NURTURING CHILDREN** --- Educative Emphasis, Learning as Opportunity
SOLIDARY, GROUP PROCESS INCENTIVE SYSTEMS	**KEEPING SCHOOL** --- Ability-Based Experiences Program-Structured Adult-Centered	**MASTER TEACHERS** --- Becoming Academically Disciplined --- **Success:** Getting Up to Grade Level **Hardest:** Reaching the Difficult Kids **Distasteful:** Lack of Administrative Support	**THE HELPERS** --- Learning to Cope with the Curriculum --- **Success:** Functioning as Students **Hardest:** Imposing Order or Regimen **Distasteful:** Kid Who Hates Being There
	TEACHING LESSONS --- Engagement-Based Activities Task-Structured Child-Centered	**THE INSTRUCTORS** --- Making Intellectual Progress --- **Success:** Kids Turn on to Learning **Hardest:** Pacing the Instruction **Distasteful:** Having to Discipline	**THE COACHES** --- Exploring New Worlds --- **Success:** Kids Click With the Teacher **Hardest:** Emotional Energy Required **Distasteful:** School Organization Stuff

Figure 2.

An Example of a 2 X 2 Matrix in the Presentation of a Qualitative Data Analysis, Entitled: Four Alternative Teaching Work Orientations and Incentive Systems. Adapted from: Mitchell, D.E., Ortiz, F.I., & Mitchell, T.E. (1987). Work Orientation and Job Performance: The Cultural Basis of Teaching Rewards and Incentives. Albany, NY: State University of New York Press, Page 69.

and "changing my schedule"; (2) structuring relationships with teachers, or as the specialists say, "working with teachers;" and (3), teaching difficult-to-teach students, or in the words of the specialists, "seeing students," "helping students," and "working with children. The analysis reveals that each of these tasks is associated with the interaction of two organizational contextual factors which in broad terms are concerned with organizational goals, structure, and technology (Perrow, 1965). For purposes of this example, the analysis of the **task of structuring relationships with teachers** will be used.

Analysis of the field data revealed that specialists find their relationship with teachers to be problematic because the organizational structure in which they work, in contrast to that of teachers', accords specialists the formal status of **specialist**. Even though the organizational structure confers the status of **specialist** to specialists, the organizational technology does not. The specialists do not have at their disposal a more valid and reliable technology than teacher for teaching difficult-to-teach students. Hence, the specialists face the problematic situation of how to structure their relationships with teachers, in their work with mutually shared students when their technical abilities do not match their **specialist status**. Classroom teachers tend to resent specialists because, in the eyes of the teachers, specialists are unable to provide useful technical knowledge in teaching difficult-to-teach students yet hold **specialist status** which provides them with work conditions which teachers do not enjoy. Teacher resentment

toward specialists leads to interpersonal **tensions** between specialists and teachers.

After the above analysis was made, the following questions needed to be addressed: How do specialists work to manage this problematic situation, i.e. their interpersonal tensions with teachers? And, Why do specialists work to manage their interpersonal tensions with teachers the way they do? These questions suggest a relationship which can be expressed as **A & B ==> C**, where **A** and **B** are factors which address the **why question** and **C** is concerned with the **how question**. Since the relationship **A & B ==> C** can be represented as a 2 X 2 matrix, this matrix is appropriate for analyzing the data.

The **first step** in the analysis was to examine the field data for variations of interpersonal tensions between specialists and teachers looking particularly for extremes. Although the variation of interpersonal tensions between specialists and teachers does not directly address the question of how specialists manage their interpersonal tensions with teachers, it was surmised that analyzing the variations and the factors related to the variations would likely lead to a response to the question of how specialists manage their relationships with teachers.

Analyzing the field data for variations among the specialists with regard to the interpersonal tension each experienced with teachers revealed that: Three specialists experience **not very tense relationships**, (Mrs. D, Mrs. O, and Mrs. H); three specialists experience **very tense relationships**

(Mrs. C, Mrs. J, and Mrs. F); and three specialists experience **moderately tense relationships** with teachers (Mrs. Ja, Mrs. S, and Mr. G).

This variation suggests the interior cells of the matrix shown in Figure 3, where **A** and **B** are factors which condition how the specialists manage their interpersonal tensions with teachers, and where the level of tension is factor **C**. The analysis in the matrix shown in Figure 3 is somewhat ambiguous because it cannot be determined where to place the specialists **who experience moderately tense** interpersonal relationships with teachers. Hence, these specialists were tentatively placed in two possible cells of the matrix.

The **second step** in the analysis was to examine the field data for factors, **A** and **B**, which would be related to and explain the variations in the interpersonal tension experienced between specialists and the teachers with whom each of the specialists worked. In previous parts of the analysis not reported here, it was found that two factors were useful in explaining other aspects of the specialist's work. These were (1) the **quality of lines of communication** specialists have with teachers, and (2) the **availability of resources specialists have to negotiate access to students**. Because these two factors had been found to be useful, it was decided to explore their usefulness in exploring factors which would be related to and explain the variation in interpersonal tension between specialists and teachers.

	A	
B	**Not very tense** interpersonal relationships with teachers --- Three specialists: Mrs. D, Mrs. O, & Mrs. H	**Moderately tense** interpersonal relationships with teachers --- Three specialists: Mrs. Ja, Mrs. S & Mr. G
	Moderately tense interpersonal relationships with teachers --- Three specialists: Mrs. Ja, Mrs. S & Mr. G	**Tense** interpersonal relationships with teachers --- Three Specialists: Mrs. C., Mrs. J., & Mr. F

Figure 3.

A 2 X 2 matrix which represents variations in interpersonal tensions between specialists and classroom teachers and the factors, A and B, which condition how the specialists manage their interpersonal tensions with teachers

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With respect to the quality of lines of communication between specialists and teachers, an analysis of the field data revealed that: Three specialists have convenient lines of communications with teachers (Mrs. D, Mrs. O, and Mrs. H); three specialists have moderately convenient lines of communications with teachers (Mrs. Ja, Mrs. S, and Mr. G); and three specialists have inconvenient lines of communications with teachers (Mrs. C, Mrs. J, Mrs. and Mrs. F).

With respect to the availability of resources specialists have to negotiate with teachers access to students, an analysis of the field data revealed that: (1) The five specialists have abundant resources (Mrs. D, Mrs. O, Mrs. H, Mrs. Ja, and Mrs. S); and four specialists have modest resources (Mrs. C, Mrs. J, Mrs. F, and Mr. G).

Since the factor, availability of negotiable resources, had two levels, and the factor, quality of lines of communication, had three levels, it was concluded that the 2 X 2 matrix analysis shown in Figure 3 needed to be expanded to a 2 X 3 matrix. The 2 X 3 matrix in Figure 4 was then proposed as a relationship between the factors: (A) availability of resources specialists have to negotiate access to students; (B) quality of lines of communication specialists have with teachers; and (C) the variations of interpersonal tensions between specialists and teachers.

The **third step** in the analysis was to address specifically the question of how the specialists manage their interpersonal tensions with teachers. Recall that in step one of the analysis

		Availability of resources specialists have to negotiate access to students	
		Ample supply of negotiable resources	Modest supply of negotiable resources
Quality of lines of communication specialists have with teachers	Convenient lines of communications with teachers	**Not very tense** interpersonal relationships with teachers --- Three specialists: Mrs. D, Mrs. O, & Mrs. H	(No specialists in this category included in the study.)
	Moderately convenient lines of communication	**Moderately tense** interpersonal relationships with teachers: --- Two Specialists: Mrs. Ja, & Mrs. S	**Moderately tense** interpersonal relationships with teachers: --- One Specialists: Mr. G
	Inconvenient lines of communication with teachers	(No specialists in this category included in the study.)	**Tense** interpersonal relationships with teachers --- Three Specialists: Mrs. C, Mrs. J, & Mr. F

Figure 4

Proposed as Relationship Between the Factors: (A) Availability of Resources Specialists Have to Negotiate Access to Students; (B) Quality of Lines of Communication Specialists Have with Teachers; and (C) the Variations of Interpersonal Tensions Between Specialists and Teachers.

the specialists were grouped by the level of tension they experienced with teachers, not how they actually managed the tension. To address the question the **how** question, the field data were scrutinized for processes of tension management associated with the different levels of tension experienced by specialists.

For the specialists who work in situations where they have convenient lines of communications with teachers and have ample resources for negotiating access to students with teachers, they can easily and continually abide by the collegial norms of teachers. In so doing the specialists established a trusting relationship with the teachers with whom they shared students. These specialists capitalize on the conditions which surround their work and reduced the tensions between themselves and the teachers with whom they share students by exaggerating their visibility with teachers. Hence, the formal status of specialists as **specialists** is minimized, tension arising from resentment by teachers is reduced, and the issue of the specialist's lack of specialized knowledge becomes moot.

For the specialists who work in situations where they have inconvenient lines of communications with teachers and have modest resources for negotiating access to students with teachers, they have difficulty in abiding by the collegial norms of teachers. These specialists cannot and do not develop trusting relationships with teachers. The specialist and the teachers with whom they share students develop a distrusting relationship, and tension continues. To manage the tension,

these specialists capitalize on the conditions which surround their work and exaggerate their isolation from the teachers with whom they share students. Hence, the formal status of the specialists as **specialists** is an ongoing issue, tension arising from resentment by teachers is not reduced, and the issue of the specialist's lack of specialized knowledge is a constant subject of comment and discussion.

For the specialists who work in situations where they have moderately convenient lines of communications with teachers and have either ample supplies of negotiable resources or modest supplies of resources at some times can and at other times cannot abide by the collegial norms of teachers. Hence, these specialists have difficulty in establishing trusting relationships with the teachers with whom they share students. Similar to the two groups of specialists, these specialists also capitalize on the conditions which surround their work. At certain times these specialists exaggerate their visibility to teachers; at other times they exaggerate their isolation from the teachers with whom they share students. Hence, the formal status of the specialists as **specialists** is sometimes an issue, tensions arising from the resentment by teachers is somewhat reduced, and the issue of the specialist's lack of specialized knowledge is sometimes a subject of a discussion.

For all three groups of specialists, they manage their interpersonal tensions with the teachers with whom they share students by managing their exposure to teachers. One group

exaggerates visibility, another group exaggerates isolation, and still another group moderates visibility with isolation.

The 2 X 3 matrix in Figure 5 presents the two factors which condition **how** the specialists manage interpersonal tensions with teachers and the **processes** they employ.

Summary

This paper has had two objectives. The first was to argue and demonstrate that the most parsimonious form of a theoretical statement among qualitative factors is a 2 X 2 matrix. And, the second was to demonstrate the utility of the 2 X 2 matrix in the analysis of qualitative data and the presentation of theoretical relationships generated in the analysis of qualitative data.

To achieve the first objective, the concept of a 2 X 2 matrix and the concept of a theoretical statement were presented. Linking these two discussions, it was shown that because the simplest form of a theoretical statement is a trivariate statement, a parsimonious way to present a trivariate theoretical statement in tabular form is a **2 X 2 matrix**.

To achieve the second objective, the terms analysis and synthesis were discussed. These terms were then employed to discuss the processes associated with analyzing qualitative data in terms analytic and synthetic process. To illustrate the presentation of a qualitative analysis of field data, a specific example was presented. And, to provide an illustration of how the 2 X 2 matrix, and its associated implied relationships, is useful in the analysis of qualitative field data, a specific

		Availability of resources specialists have to negotiate access to students	
		Ample supply of negotiable resources	Modest supply of negotiable resources
Quality of lines of communication specialists have with teachers	Convenient lines of communications with teachers	**Not very tense** interpersonal relationships with teachers--- Abide by collegial norms of teachers. Develop trusting relationship with teachers.--- **Exaggerate visibility**	(No specialists in this category included in the study.)
	Moderately convenient lines of communication	**Moderately tense** interpersonal relationships with teachers--- Moderately abide by the collegial norms of teachers. Develop a moderate trusting relationship with teachers.--- **Moderate visibility with isolation**	**Moderately tense** interpersonal relationships with teachers--- Moderately abide by the collegial norms of teachers. Develop a moderate trusting relationship with teachers.--- **Moderate visibility with isolation**
	Inconvenient lines of communication with teachers	(No specialists in this category included in the study.)	**Tense** interpersonal relationships with teachers--- Do not abide by the collegial norms of teachers. Develop distrusting relationships with teachers.--- **Exaggerate isolation**

Figure 5

The Relationship Between the Factors: Availability of Resources Specialists Have to Negotiate Access to Students; Quality of Lines of Communication Specialists Have with Teachers; and The Relationship of These Factors to How Specialists Manage Their Interpersonal Tensions with the Teachers With Whom They Share Students.

example of the process of employing the 2 X 2 matrix in the analysis of qualitative data was presented.

References

Briggs, John & Peat, F. David. (1989). Turbulent Mirror: An Illustrated Guide to Chaos Theory and the Science of Wholeness. New York, NY: Harper & Row, Publishers.

Bruyn, Severyn T. (1966). The Human Perspective in Sociology: The Methodology of Participant Observation. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Denzin, Norman K. (1978). The Research Act: A Theoretical Introduction to Sociological Methods (2nd ed.). New York, NY: McGraw-Hill Book Company.

Durkheim, Emile. (1938, 1966). The Rules of Sociological Method. New York, NY: The Free Press.

Glaser, Barney G. & Strauss, Anselm L. (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research. Chicago, IL: Aldine Publishing Company.

Gleick, James. (1987). Chaos: Making a New Science. New York, NY: Penguin Books.

Hammond, Phillip E. (Ed.). (1964). Socialists at Work: Essays on the Craft of Social Research. New York, NY: Basic Books, Inc.

Kaplan, Abraham. (1964). The Conduct of Inquiry: Methodology for Behavioral Science. Scranton, PA: Chandler Publishing Co.

Kerchner, Charles Taylor & Mitchell, Douglas E. (1988). The Changing Idea of a Teacher's Union. New York, NY: The Falmer Press.

Kerlinger, Fred N. (1973). Foundations of Behavioral Research (2nd ed.). New York, NY: Holt, Rinehart, and Winston, Inc.

Lincoln, Yvonna S. & Egon G. Guba. Naturalistic Inquiry. Beverly Hills, CA: Sage Publications.

Lofland, John & Lofland, Lyn H. (1984). Analyzing Social Settings: A Guide to Qualitative Observation and Analysis (2ed.). Belmont, CA: Wadsworth Publishing Company.

Marshall, Catherine & Rossman, Gretchen B. (1989). Designing Qualitative Research. Newbury Park, CA: Sage Publishers.

Merton, Robert K. (1968). Social Theory and Social Structure. New York, NY: The Free Press.

Miles, Matthew B. & Huberman, A. Michael. (1984). Qualitative Data Analysis: A Sourcebook of New Methods. Newbury Park, CA: Sage Publications.

Mills, C. Wright. (1959). The Sociological Imagination. New York, NY: Oxford University Press.

Mitchell, Douglas E. (1984). Educational Policy Analysis: The State of the Art. Educational Administration Quarterly, 20(3), 129-160.

Mitchell, Douglas E., Ortiz, Flora Ida, & Mitchell, Tedi K. (1987). Work Orientation and Job Performance: The Cultural Basis of Teaching Rewards and Incentives. Albany, NY: State University of New York Press.

Mitchell, Douglas E. & Spady, William G. (1983). Authority, Power, and Legitimation of Social Control. Educational Administration Quarterly, 19(1), 5-33.

Perrow, Charles (1965). Hospitals, Technology, Structure, and Goals. In James G. March (Ed.), Handbook of Organizations. Chicago, IL: Rand McNally and Co.

Reed, Donald B. (1982). The Instructional Work of School-Based Specialists: A Response to Organizational Factors. A paper presented at the Ethnography in Education Research Forum, Philadelphia, Pennsylvania, March, 1982.

Reed, Donald B. (1986). School Specialists: Their Work and the Organizational Factors which Condition Their Work. A paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, California, April, 1986.

Schatzman, Leonard & Strauss, Anselm. (1973). Field Research: Strategies for a Natural Sociology. Englewood Cliffs, NJ: Prentice-Hall, Inc..

Strauss, Anselm L. (1987). Qualitative Analysis for Social Scientists. New York. NY: Cambridge University Press.

Weick, Karl E. (1969, 1979). The Social Psychology of Organizing. Reading, MA: Addison-Wesley Publishing Co.